REMARKS

In the Office Action, the Examiner reviewed claims 1-8 of the above-identified US Patent Application, with the result that the drawings were objected to under 37 CFR 1.83(a), and all of the claims were rejected under either 35 USC §102 or 35 USC §103 in view of U.S. Patent No. 4,988,844 to Dietrich et al. (Dietrich). In response, Applicants have amended the claims as set forth above. More particularly:

Independent claims 1 has been amended to incorporate the limitation from its dependent claim 4 that the electron beam (28) defines a beam pattern.

Independent claims 1 and 6 have each been amended to clarify that, relative to the central region of the surface of the coating material (26), the beam pattern has a higher intensity at the interface of the surface of the coating material (26) with the crucible (56). In other words, the higher intensity is required to exist where the coating material surface contacts the crucible (56), as discussed in Applicants' specification in reference to Figures 11 and 12.

Dependent claims 3 and 4 have been revised to correspond to the amendments to their parent claim 1.

Finally, new dependent claims 9 and 10 recite means for projecting a separate beam pattern (97) on the crucible (56) for evaporating droplets of the molten coating material (26) on the crucible (56), and that the separate beam pattern (97) has a higher intensity than the beam pattern on the coating material (26). Support for these limitations

can be found in Applicants' specification in reference to Figures 11 and 12.

Applicants believe that the above amendments do not present new matter. Favorable reconsideration and allowance of claims 1-10 are respectfully requested in view of the above amendments and the following remarks.

Objection to the Drawings

In the Office Action, the Examiner objected to the drawings under 37 CFR §1.83(a) for failing to show every feature of the invention specified in the claims. The Examiner stated that the drawings "fail to show items 28 and 84 in Figures 11 and 12 as described in the specification (page 19)." In response, Applicants submit herewith revised drawing sheet 9 (Figures 11 and 12) showing the addition of reference number 28 to identify the electron beam 28 in Figures 11 and 12, and the addition of reference number 84 to identify the surface of the crucible in Figure 11. Applicants also submit herewith revised drawing sheet 8 (Figure 10) showing the addition of reference number 56 to identify the crucible in Figure 10, which was inadvertently omitted. The changes are highlighted in accordance with MPEP §608.02(v). A separate letter to the Official Draftsman in accordance with MPEP §608.02(r) is also submitted herewith. Formal drawings will be filed once the proposed drawing changes have been approved by the Examiner.

Rejections under 35 USC §102

Claims 1-4, 6 and 7 were rejected under 35 USC §102(b) as being anticipated by Dietrich on the basis of Dietrich's disclosure of an electron beam melting furnace equipped with a crucible 6 containing a bath 8 of molten evaporate, and electron beams 17 and 18 generated by electron beam guns 10 and 11, with the explanation that

> Each electron beam gun having a higher intensity at a location between the surface of the coating material and the crucible than at a central region of the surface of the coating material - Here, Dietrich et al teaches that a combination of two electron beam guns can produce the claimed intensity profile in the x direction as shown in the graph of Figure 1 (38). (Original emphasis.)

However, as originally filed, Applicants' claim 1 required "the electron beam having a higher intensity at an interface between the surface of the coating material and the crucible than at a central region of the surface of the coating material" (emphasis added), and not merely "a location between the surface of the coating material and the crucible." Similarly, claim 6 as originally filed located the "higher intensity at an interface between the surface of the coating material and the contiguous surface portion of the crucible." In each case, Applicants' independent claims required that the higher intensity exists where the surface of the coating material (26) meets or contacts the crucible (56), as shown in Figures 11 and 12. In contrast, Dietrich clearly shows the electron beams 17 and 18 project patterns 26 and 27 that are located entirely on the surface 9 of the bath 8, such

that the high intensity peaks 39 and 40 are also entirely located on the bath surface 9, as shown in Dietrich's Figure 3. While the Examiner cited Dietrich as allowing for the beams 17 and 18 to be projected onto the surface of the crucible 6, Applicants can find no such disclosure in Dietrich. To the contrary, Dietrich teaches that "as even a surface temperature as possible is reached on a specific surface" when evaporating material with an electron beam (i.e., Applicants' claimed "physical vapor deposition coating apparatus"). Dietrich further teaches that "[i]n electron beam melting units, it is important that the electron beam does not strike beside the material to be melted." These passages teach away from what Applicants' invention recited in the claims.

The Examiner also cited Dietrich as teaching

> a beam pattern (as shown in Figure 11 of the application) with proximal and distal points at the perimeter of the beam pattern - Here, Dietrich et al already establishes the capability of forming one arcuate beam consisting of a semi-circle as described (column 3, lines 25-30). It is evident from the Dietrich et al deflection control (column 2, lines 53-58; column 4, lines 51-55) of the electron beams that, once "conveyor rod 5" (column 2, line 43) is raised.

Applicants are not clear as to the meaning of the above passage. However, Dietrich clearly shows that the lower intensity regions of the beam patterns 26 and 27 (i.e., between the terminal portions 30/31 and 32/33 of the patterns 26 and 27) are <u>not</u> distal and proximate relative to the guns 10 and 11, but instead are <u>intermediate</u> <u>lateral</u> points relative to the guns 10 and 11. In other words, Dietrich's patterns 26 and 27 are turned

ninety degrees relative to Applicants' claimed beam pattern.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 USC §102.

Rejection under 35 USC §103

In view of the above comments regarding the rejection under 35 USC §102, Applicants believe that Dietrich does not suggest their invention recited in claims 5 and 8, which depend from claims 1 and 6, respectively. Specifically, Dietrich does not teach or suggest projecting the electron beams 17 and 18 so that a higher beam intensity exists where the surface 9 of the bath 8 interfaces with the crucible 6, but instead discloses the beams 17 and 18 as projecting patterns 26 and 27 that are located entirely on the surface 9 of the bath 8. Therefore, Applicants respectfully request withdrawal of the rejection of the claims under 35 USC §103.

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Should the Examiner have any questions with respect to any matter now of record, Applicants' representative may be reached at (219) 462-4999.

Respectfully submitted,

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Attachments: Appendix A; Request for Drawing Correction(s) in Accordance with MPEP 608.02(r); Revised drawing sheets 8/11 and 9/11.

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APPENDIX A
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VERSION WITH MARKINGS TO SHOW CHANGES MADE[1]

In the Claims:

Claims 1, 3, 4 and 6 have been amended as follows:

1. (Amended) An electron beam physical vapor deposition coating apparatus comprising:

a coating chamber at an elevated temperature and a subatmospheric pressure;

a crucible within the coating chamber;

a coating material surrounded by and contained within the crucible, the coating material having a surface exposed by the crucible;

an electron beam gun projecting an electron beam onto the surface of the coating material, the electron beam defining a beam pattern having a higher intensity at an interface of [between] the surface of the coating material with and the crucible than at a central region of the surface of the coating material.

3. (Amended) An electron beam physical vapor deposition coating apparatus according to claim 1, wherein the electron beam is also projected onto a surface portion of the crucible contiguous with the surface of the coating material, the [electron] beam pattern having a higher intensity on the surface portion of the crucible than at the central

[1] Brackets "[]" indicate deletions and underlining "__" indicates insertions.

region of the surface of the coating material.

4. (Amended) An electron beam physical vapor deposition coating apparatus according to claim 1, wherein the [electron beam forms a] beam pattern has [with] a perimeter on the surface portion of the crucible, the electron beam being incident on the surface of the coating material at an oblique angle so as to establish relative to the electron beam gun a proximal point and an oppositely-disposed distal point at the perimeter of the beam pattern, the beam pattern having a lower intensity at the proximal and distal points than elsewhere at the perimeter of the beam pattern.

6. (Amended) An electron beam physical vapor deposition coating apparatus comprising:

a coating chamber containing a coating material, the coating chamber being at an elevated temperature and a pressure greater than 0.010 mbar;

a crucible within the coating chamber;

a coating material surrounded by and contained within the crucible, the coating material having a surface exposed by the crucible;

an electron beam gun projecting an electron beam onto the surface of the coating material and a contiguous surface portion of the crucible, the electron beam forming a beam pattern with a perimeter on the contiguous surface portion of the crucible, the electron beam gun melting the surface of the coating material and evaporating molten

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coating material, the electron beam having a higher intensity at an interface of [between] the surface of the coating material with [and] the contiguous surface portion of the crucible than at a central region of the surface of the coating material, the electron beam being incident on the surface of the coating material at an oblique angle so as to establish relative to the electron beam gun a proximal point and an oppositely-disposed distal point at the perimeter of the beam pattern, the electron beam having a lower intensity at the proximal and distal points than elsewhere at the perimeter of the beam pattern.